

CLAIMS

What is claimed is:

1. An apparatus for gravel packing comprising:

(a) a base pipe having a plurality of apertures disposed along at least a portion
5 of its length, said base pipe adapted to be disposed within a wellbore;

(b) a screen coaxially secured to said base pipe adjacent said apertures, said
screen being substantially permeable to fluids and impermeable to sand; and

(c) at least one channel disposed within said screen, which is permeable to
fluids along its length, and has at least one port adapted to allow a sand and fluid slurry
10 mixture to pass into or out of said screen.

2. An apparatus for gravel packing according to claim 1, wherein said screen
comprises an inner screen jacket and an outer screen jacket secured thereto.

3. An apparatus for gravel packing according to claim 2, wherein said inner
screen jacket is formed by fusion welding a helically-wound steel wire to a plurality of
15 equally-spaced support rods.

4. An apparatus for gravel packing according to claim 2, wherein said inner
screen jacket is formed of a wire mesh screen.

5. An apparatus for gravel packing according to claim 2, wherein said outer
screen jacket is formed by fusion welding a helically-wound steel wire to a plurality of
20 equally-spaced support rods.

6. An apparatus for gravel packing according to claim 2, comprising a plurality of equally spaced support ribs disposed between the inner screen jacket of the screen and the outer screen jacket of the screen, wherein said at least one channel is formed between a pair of two adjacent support ribs.

5 7. An apparatus for gravel packing according to claim 6, wherein four support ribs are disposed between the inner screen jacket of the screen and the outer screen jacket of the screen, thereby forming four discrete arc-shaped channels.

8. An apparatus for gravel packing according to claim 6, further comprising a pair of end rings secured at opposite ends of the screen between the base pipe and the plurality of support ribs.
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9. An apparatus for gravel packing according to claim 2, wherein the outer screen jacket is formed in multiple sections.

10. An apparatus for gravel packing according to claim 9, further comprising a plurality of diverter rings, wherein each diverter ring is secured over said inner screen jacket and between different adjacent sections of said outer screen jacket, and wherein each diverter ring has at least one port, which communicates with an annulus formed between the apparatus and the wellbore.
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11. An apparatus for gravel packing according to claim 10, wherein there are at least three diverter rings, each diverter ring having two ports, which are disposed 180 degrees apart from one another, and wherein the ports on each diverter ring are disposed 60 degrees out of phase from the ports of an adjacent ring.
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12. An apparatus for gravel packing according to claim 2, wherein said screen has a plurality of ports formed at discrete intervals along its length, which communicate with an annulus formed between the apparatus and the wellbore.

13. An apparatus for gravel packing according to claim 12, wherein there are
5 at least three intervals of ports formed along the length of said screen.

14. An apparatus for gravel packing according to claim 13, wherein two ports are disposed at each interval 180 degrees apart from one another and 60 degrees out of phase from the ports at adjacent intervals.

15. An apparatus for gravel packing according to claim 1, further comprising a
10 plurality of screens connected end-to-end adjacent the plurality of apertures in the base pipe.

16. A method of gravel packing a subterranean formation adjacent to an oil and gas reservoir using the apparatus of claim 1, comprising the steps of:

(a) drilling a hole into the subterranean formation thereby forming said
15 wellbore;

(b) positioning said apparatus inside of the wellbore adjacent to the oil and gas reservoir; and

(c) injecting a sand and fluid slurry mixture through said at least one channel into an annulus formed between said apparatus and said wellbore until said annulus and
20 screen are substantially packed with sand.

17. A method of gravel packing according to claim 16, further comprising the step of forming a casing within the wellbore.

18. A method of gravel packing according to claim 17, wherein said casing is formed by cementing said wellbore.

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FOOTNOTES